Corrections to “Statistical Mechanics and Random Matrices”

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I am very grateful to people who help me correcting these lecture notes. I thank in particular Florent Benaych-Georges and Ofer Zeitouni.

• In section 5.1, $\mu$ and $\mu_\Phi$ are the same. $\Gamma_1$ is the carré du champ; it was defined page 54 and corresponds to the Euclidean norm of the gradient.

• The formula for the Harish-Chandra-Itzykson integral

$$I^{(2)}_N(A, B) = \int e^{N\text{tr}(ABU^*)} dU$$

p. 214 is missing a factor. In fact, with $A = \text{diag}(a_1, \ldots, a_N)$ and $B = \text{diag}(b_1, \ldots, b_N)$, and $\Delta(x)$ the Vandermonde determinant $\Delta(x) = \prod_{i<j}(x_i - x_j)$ we wrote

$$I^{(2)}_N(A, B) = \frac{\det(e^{a_i b_j})_{1 \leq i, j \leq N}}{\Delta(a)\Delta(b)}.$$  

The true formula is

$$I^{(2)}_N(A, B) = \Delta(\rho) \times \frac{\det(e^{a_i b_j})_{1 \leq i, j \leq N}}{\Delta(a)\Delta(b)}$$

with $\rho_{ii} = i - 1$, $1 \leq i \leq N$. This additional term however does not give any contribution on the scale $e^{N^2}$ and thus this error does not affect the rest of the section.

• In Definition 20.9, $\limsup_{N \to \infty} P_N(d(Z_N, \tilde{Z}_N) > \delta) = -\infty$ should be replaced by

$$\limsup_{N \to \infty} a_N^{-1} \log P_N(d(Z_N, \tilde{Z}_N) > \delta) = -\infty.$$